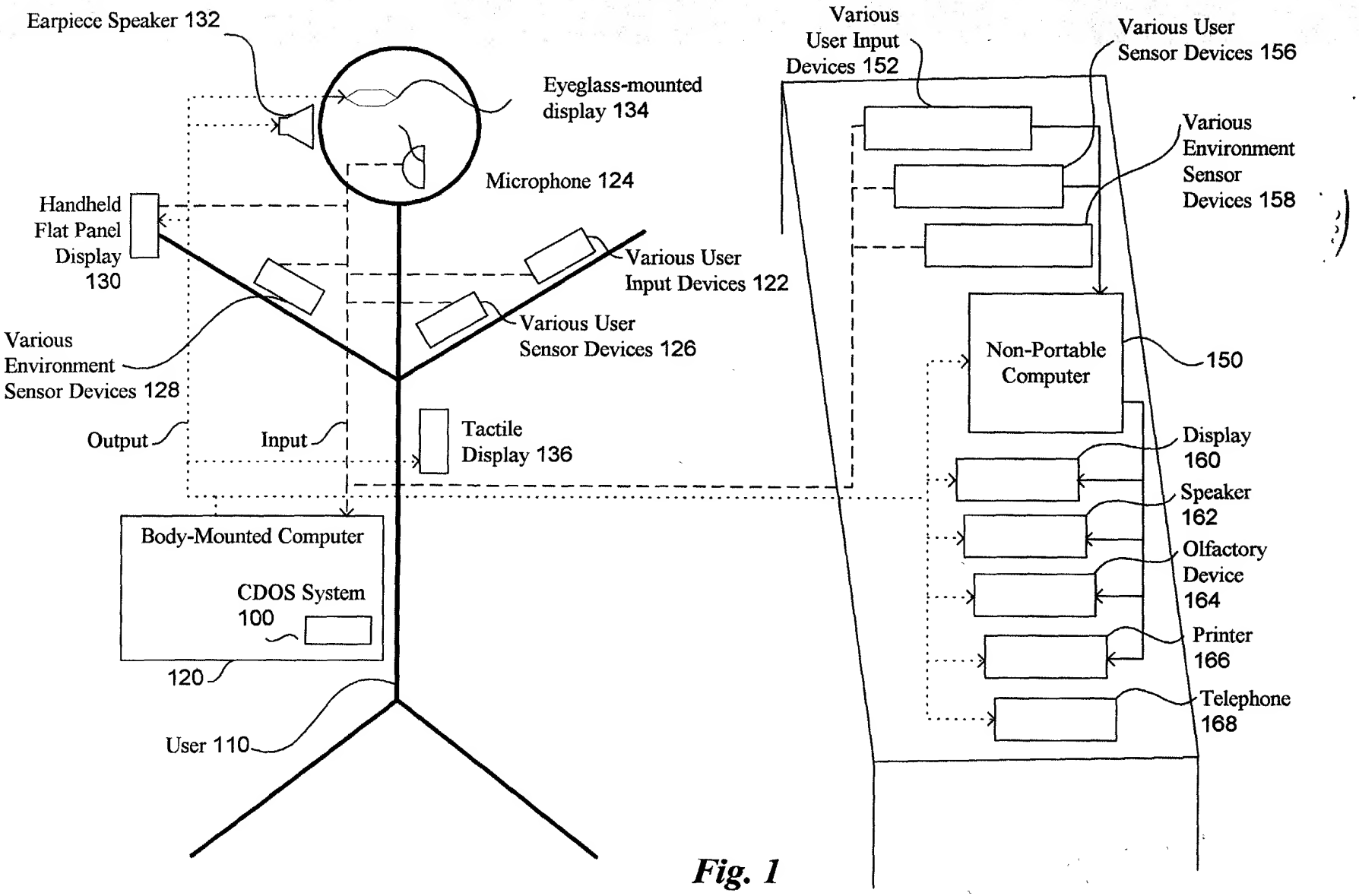
Earpiece Speaker 132
Eyeglass-mounted display 134
Microphone 124
Handheld Flat Panel Display 130
Various User Input Devices 122
Various User Sensor Devices 126
Various Environment Sensor Devices 128
Output
Input
Tactile Display 136
Body-Mounted Computer
CDOS System 100
120
User 110
Various User Input Devices 152
Various User Sensor Devices 156
Various Environment Sensor Devices 158
Non-Portable Computer
150
Display 160
Speaker 162
Olfactory Device 164
Printer 166
Telephone 168

Fig. 1

Fig. 2

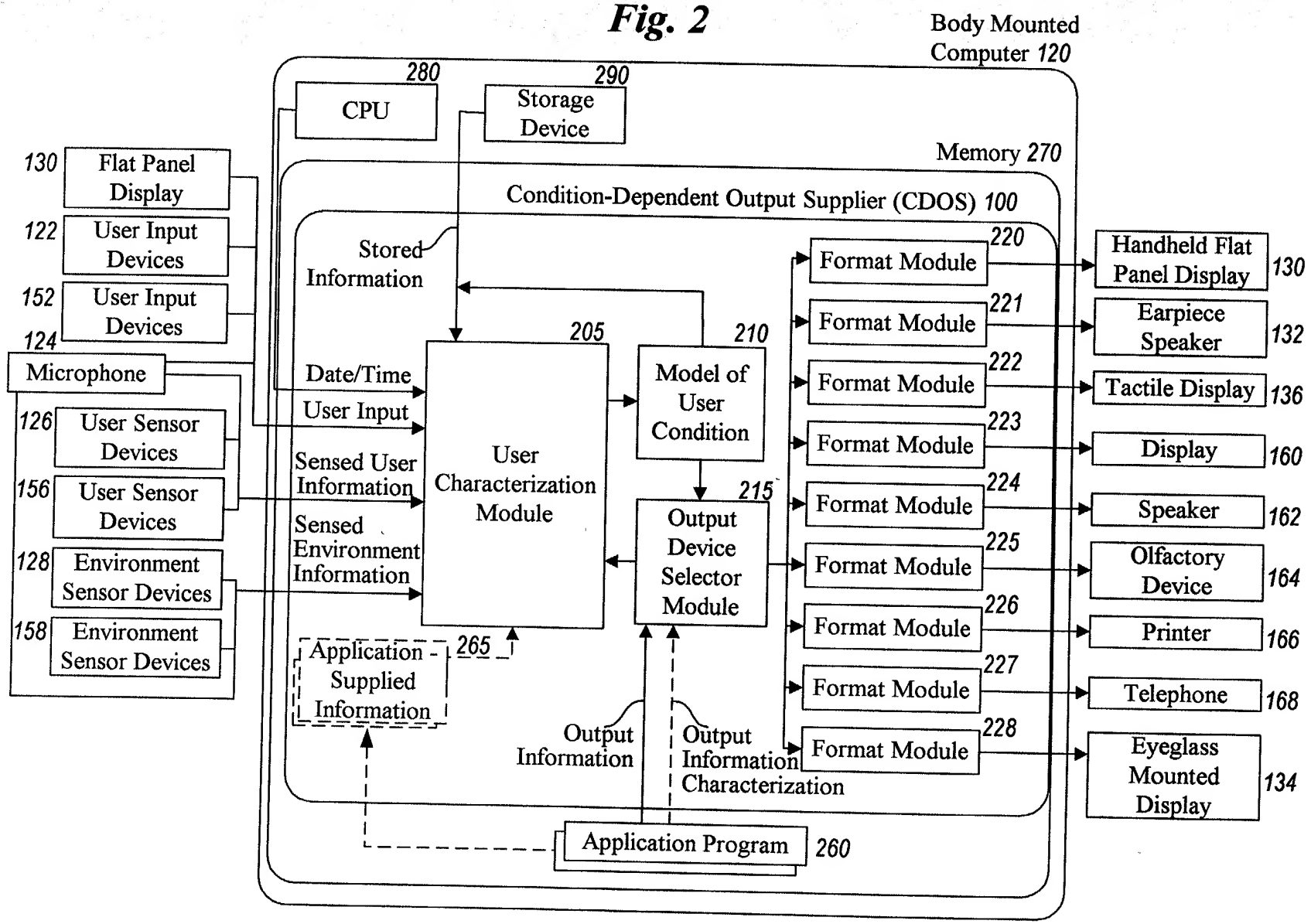
Body Mounted Computer 120
280
CPU
290
Storage Device
Memory 270
Condition-Dependent Output Supplier (CDOS) 100
130 Flat Panel Display
122 User Input Devices
152 User Input Devices
124 Microphone
126 User Sensor Devices
156 User Sensor Devices
128 Environment Sensor Devices
158 Environment Sensor Devices
Stored Information
205
User Characterization Module
210
Model of User Condition
215
Output Device Selector Module
Date/Time
User Input
Sensed User Information
Sensed Environment Information
Application - Supplied Information
265
Output Information
Output Information Characterization
Application Program
260
220 Format Module
221 Format Module
222 Format Module
223 Format Module
224 Format Module
225 Format Module
226 Format Module
227 Format Module
228 Format Module
Handheld Flat Panel Display 130
Earpiece Speaker 132
Tactile Display 136
Display 160
Speaker 162
Olfactory Device 164
Printer 166
Telephone 168
Eyeglass Mounted Display 134

Fig. 3

Model of User Condition 210

User: X Time: 14:22 Date 10/15/XX		
Latitude	37°55.3′ N	
Longitude	95°24.7′ W	
Altitude	102′	
Heart Rate	57 beats/minute	
Blood Pressure	125 / 80	
Last User Input	Voice Command "Stop Recording"	
Ambient Temperature	67°F	
Ambient Noise	20 dB	
Location	Office	
Speed	2 MPH	+/- 10%
Nearby Objects	Desk	
Nearby People	Physical: None. Audio: "Doug Smith"	
User Activity	Talking on Cell Phone, Walking	Highly Likely
Cognitive Load	77	
Level of Privacy	Company, Executive	
Scope of Audience	Self	
Application X-Factor 1	Normal: Mean-23, Std Dev 3	
User Format Preference	Visual > Auditory	
User Device Preference	Eyeglass Mounted Display	

Fig. 4

User Characterization Module *205*

User: X

IF <Latitude> ≈ "37°55.2'N" AND <Longitude> ≈ "95°24.7'W" THEN <Location> = "Office"

IF <Infrared.Link.To.Desktop> = True THEN <Nearby Objects> Includes "Desk"

IF <Voice.Recognition.ID> <> "X" AND <Speakerphone.Status> = "Disabled" THEN <Nearby People> Includes ValueOf <Voice.Recognition.ID>

IF <Desktop.Motion.Sensor.Human.Movement> = True AND <User Activity> Includes "Seated" THEN <Nearby People.Physical> Includes "Unidentified Person"

IF <User Activity> = "Walking" THEN <Cognitive Load> = 20

IF <User Activity> = "Talking *" THEN <Cognitive Load> = 55

IF <User Activity> Includes "Walking" AND <User Activity> Includes "Talking On Cell Phone" THEN <Cognitive Load> = 77

WHILE <Output.To.User> = True THEN <Cognitive Load> = +10

WHILE <User.Mood> Includes "Angry" THEN <Cognitive Load> = +20%

IF <Nearby People.*> Includes Only [Company Executives] THEN <Level Of Privacy> Includes "Executive"

IF <Nearby People.*> Includes Only [Company Employees] THEN <Level of Privacy> Includes "Compa ny"

IF <Nearby People.Physical> = "None" THEN <Scope of Audience> = "Self"

IF <Output.Intrusive.To.Others> = "Likely" THEN <Scope of Audience> = "Self"

AppX:IF <Application X-Factor 1.Mean> > 25 THEN <Application X Output> = "Undesired" WITH Likeliho od "Likely"

IF (<Current.Time> - <Time.Of.Last.User.Input>) > 5 minutes THEN <Interacting.With.Computer> = False WITH Likelihood "Somewhat Likely"

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20070207.082626

Fig. 5

Output Device Selector Module *215*

User: X								
Device	Currently Available	In Use	Supported Senses	Cognitive Load	Level of Privacy	Scope of Audience	Degree of Interruptibility	Degree of Intrusiveness on Others
Handheld Flat Panel Display *130*	X		Visual, Audio	Very Low-Medium	All	Self [+3]	Low	Very Low
Earpiece Speaker *132*	X	X	Audio	Very Low-Somewhat High	All	Self	Low-Very High	Very Low
Eyeglass Mounted Display *134*	X		Visual	Very Low-Somewhat Low	All	Self	Medium-High	Very Low
Tactile Display *136*	X		Tactile	Very Low-Very High	All	Self	Very Low-Very High	Very Low
Display *160*	X		Visual	Very Low-Somewhat High	Business, Sensitive	Self +6	Low-Medium	Very Low-Medium
Speaker *162*	X		Audio	Low-Somewhat High	Business	Many	Medium-High	Low-Very High
Olfactory Device *164*	X		Olfactory	Medium-Somewhat High	Close Friends	Many	Very Low-Somewhat Low	Medium-Very High
Printer *166*	X		Visual	Very Low-Very High	Business	Unlimited	Very Low	Somewhat High
Telephone *168*	X		Audio	Very Low-Medium	Family	Self	High-Very High	High-Very High
Pager *502*			Visual, Audio, Tactile	Very Low-High	All	Self	High	Medium-Very High
Cellular Telephone *504*			Audio	Very Low-Medium	Highly Sensitive	Self	Medium-High	High-Very High
Car Radio *506*			Audio	Low-Somewhat High	Sensitive	Self + Few	Low-High	High
. . .								

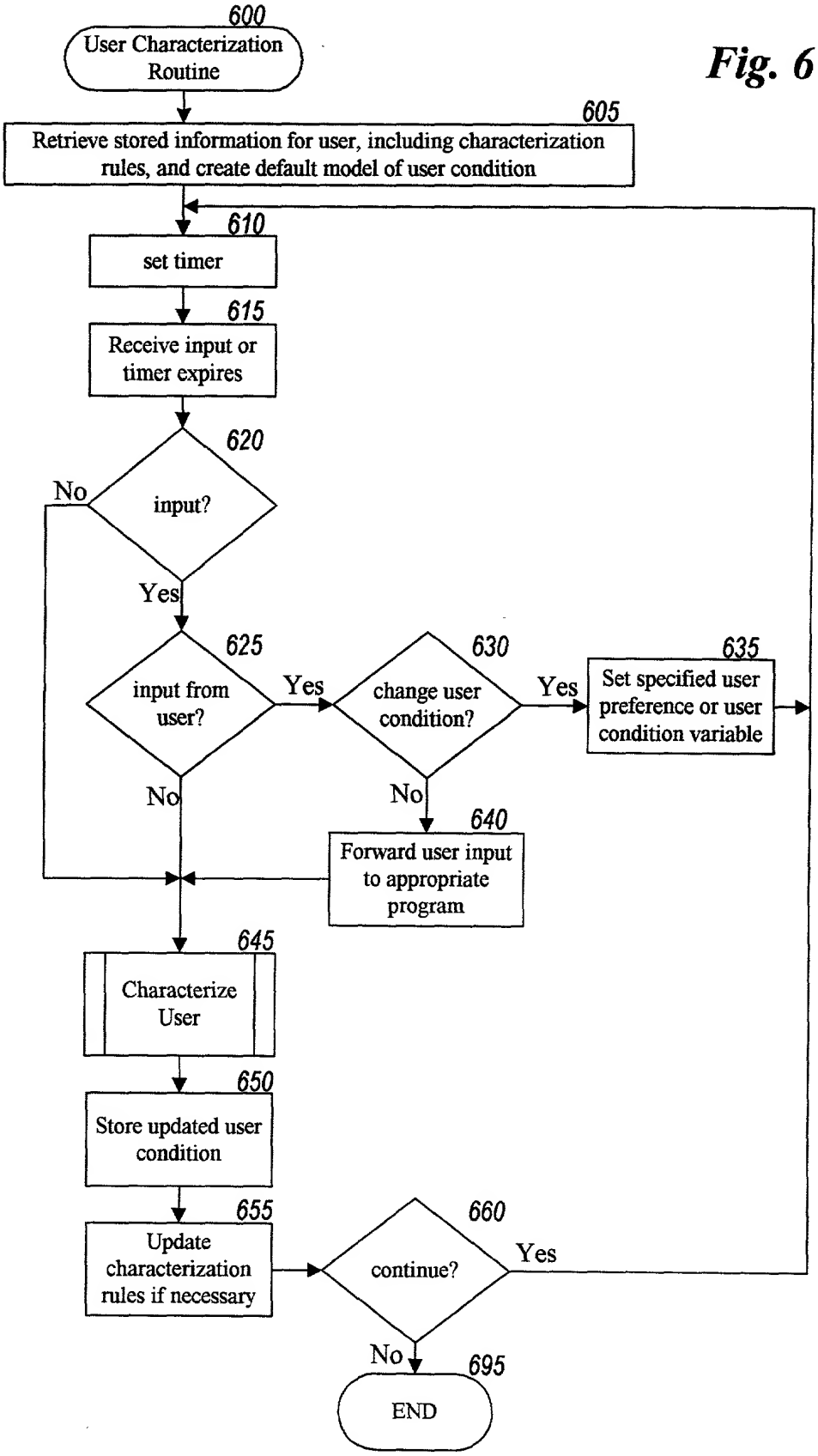

600
User Characterization Routine
605
Retrieve stored information for user, including characterization rules, and create default model of user condition
610
set timer
615
Receive input or timer expires
620
input?
No
Yes
625
input from user?
Yes
630
change user condition?
Yes
635
Set specified user preference or user condition variable
No
No
640
Forward user input to appropriate program
645
Characterize User
650
Store updated user condition
655
Update characterization rules if necessary
660
continue?
Yes
No
695
END

Fig. 6

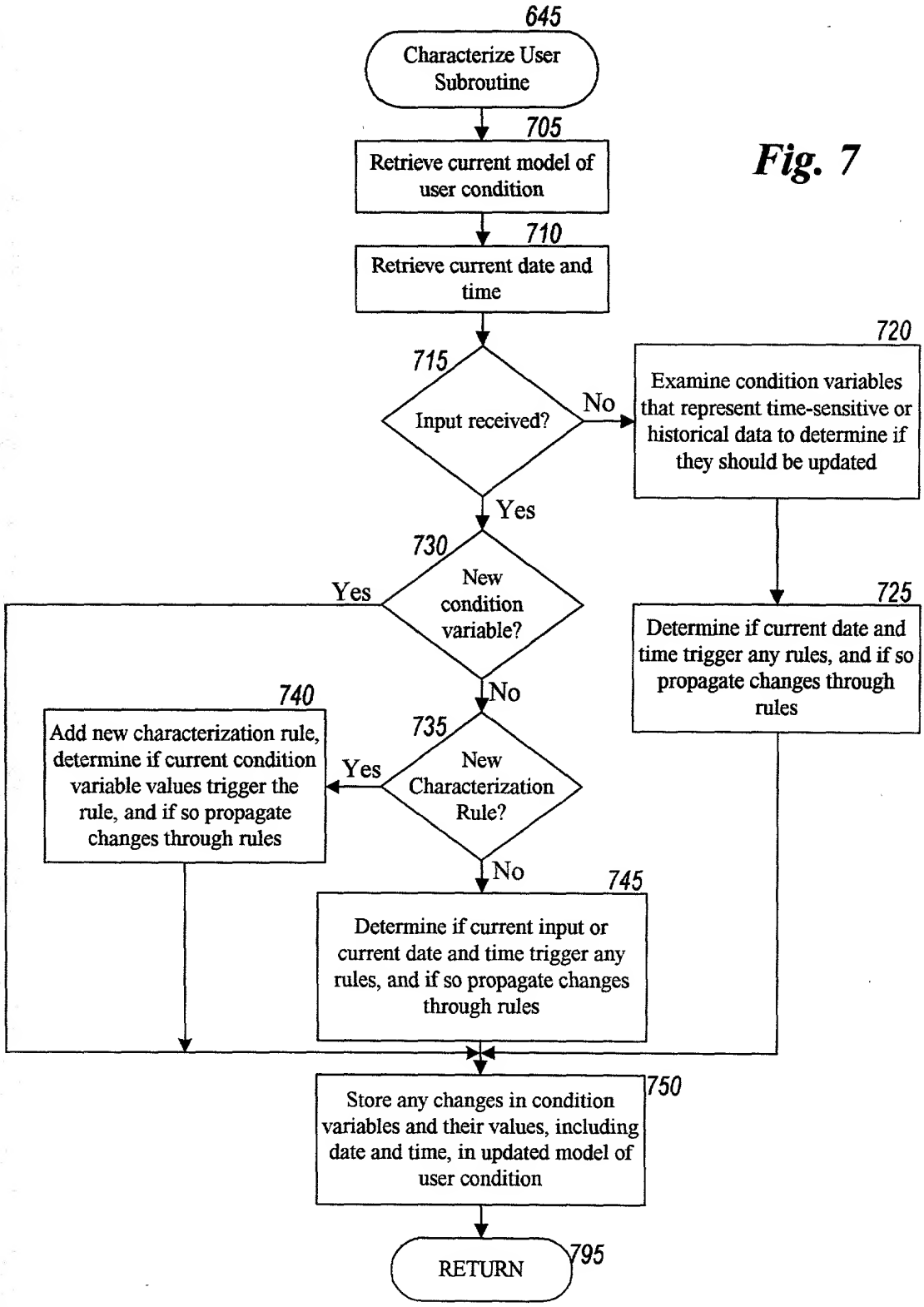

645
Characterize User Subroutine
705
Retrieve current model of user condition
710
Retrieve current date and time
715
Input received?
No
720
Examine condition variables that represent time-sensitive or historical data to determine if they should be updated
Yes
730
New condition variable?
Yes
725
Determine if current date and time trigger any rules, and if so propagate changes through rules
No
740
Add new characterization rule, determine if current condition variable values trigger the rule, and if so propagate changes through rules
735
New Characterization Rule?
Yes
No
745
Determine if current input or current date and time trigger any rules, and if so propagate changes through rules
750
Store any changes in condition variables and their values, including date and time, in updated model of user condition
RETURN
795

Fig. 7

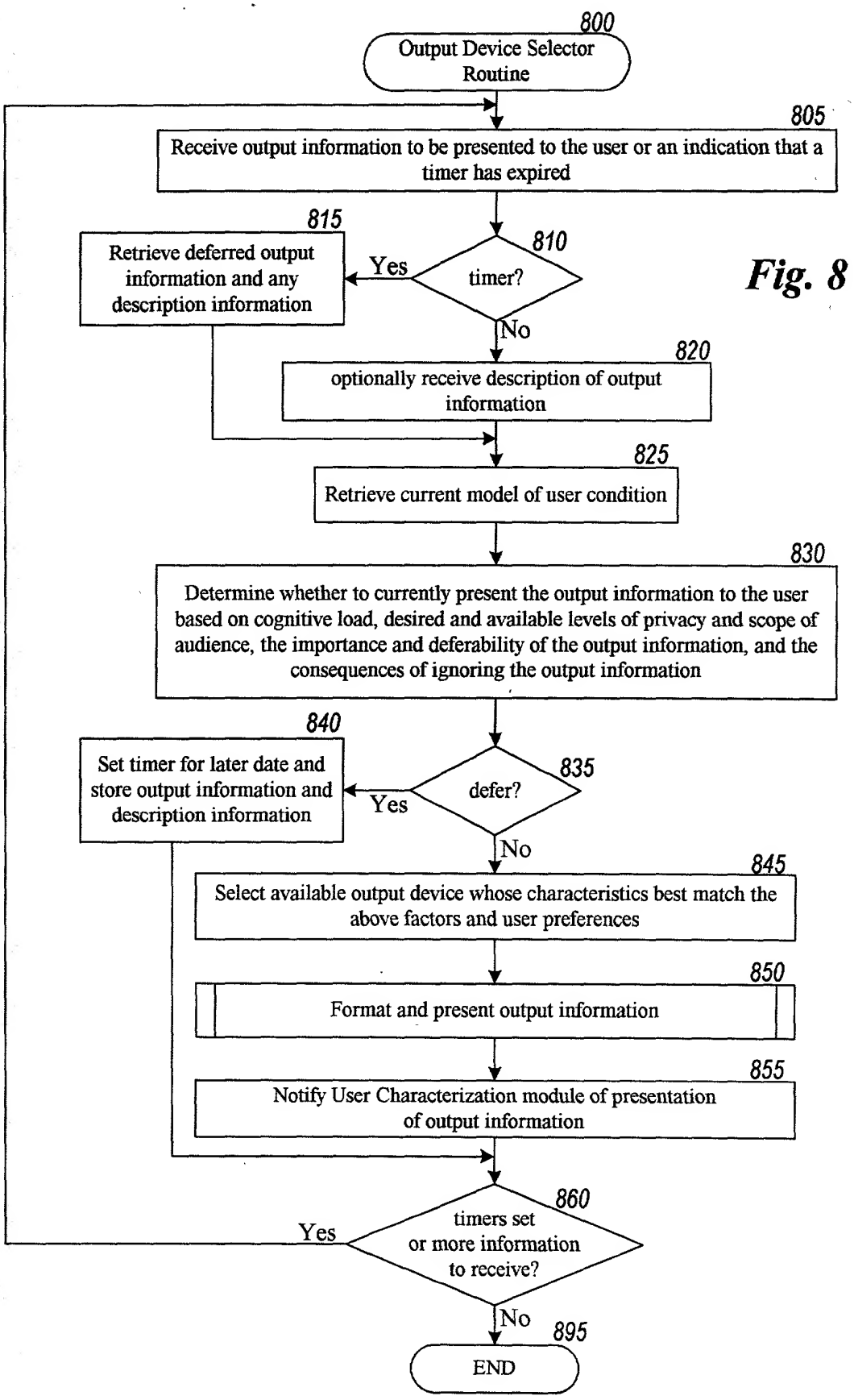
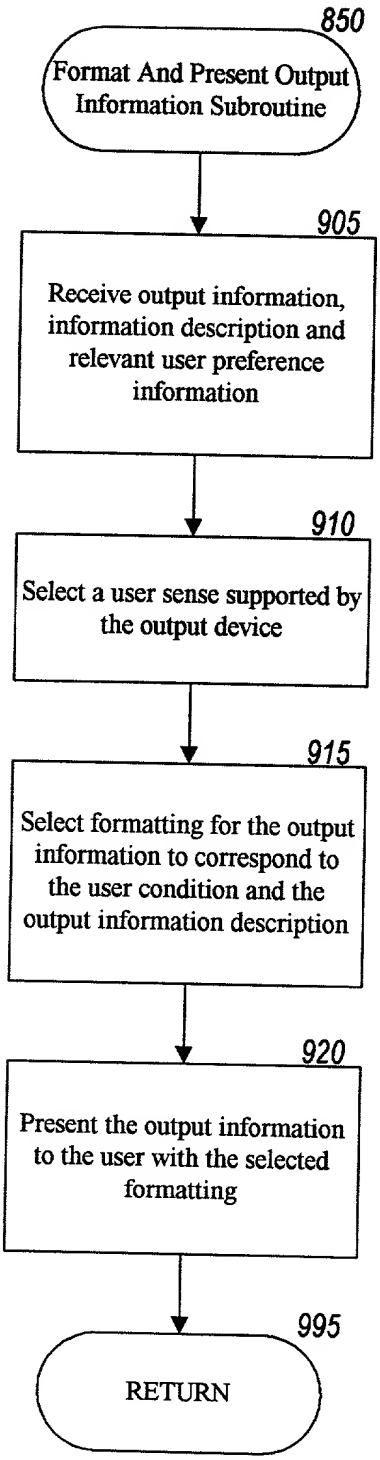

800
Output Device Selector Routine
805
Receive output information to be presented to the user or an indication that a timer has expired
810
timer?
Yes
815
Retrieve deferred output information and any description information
No
820
optionally receive description of output information
825
Retrieve current model of user condition
830
Determine whether to currently present the output information to the user based on cognitive load, desired and available levels of privacy and scope of audience, the importance and deferability of the output information, and the consequences of ignoring the output information
835
defer?
Yes
840
Set timer for later date and store output information and description information
No
845
Select available output device whose characteristics best match the above factors and user preferences
850
Format and present output information
855
Notify User Characterization module of presentation of output information
860
timers set or more information to receive?
Yes
No
895
END

Fig. 8

Fig. 9


850
Format And Present Output Information Subroutine
905
Receive output information, information description and relevant user preference information
910
Select a user sense supported by the output device
915
Select formatting for the output information to correspond to the user condition and the output information description
920
Present the output information to the user with the selected formatting
995
RETURN